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Project Title: Biologically Integrated Vineyard Systems (BIVS) in the Central San Joaquin Valley

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Summary:

To encourage implementation of production systems which replace inputs that are either disruptive to nontarget organisms or have been found to be sources of off-site contamination, we have initiated a "biologically integrated vineyard systems" (BIVS) approach in the central San Joaquin Valley, based on the BIOS model developed in almond orchards in Merced County. The BIVS program has five main components:

1. Provide a support network for grower participants.
2. Maintain an advisory team to help guide the grower participants.
3. Establish a set of guidelines and goals for each grower participant.
4. Monitor acreage set aside under the BIVS program on pests, natural enemies, yields, and quality.
5. Demonstrate BIVS systems through field days.

We have made progress in each of these categories: The BIVS program started in the fall of 1995 with 11 growers, and has expanded to a total of 30 at present. BIVS provides a support network in the form of monthly breakfast meetings, where growers have an opportunity to discuss issues and exchange ideas for solutions. In addition, BIVS has an advisory team to assist growers in developing a program compatible with BIVS objectives. The advisory team meets with each grower participant in the fall/winter to establish a program. BIVS acreage was monitored weekly from May-Sept. 1996; the majority of growers treated only once for all insect pests. BIVS held three field days in 1996: a cover crops demonstration day, a mite management and identification day, and a weed management day.

Results and Discussion

Objective 1 was the establishment of a network of grape growers in the central San Joaquin Valley who are committed to reducing disruptive or polluting chemical inputs through a biologically integrated system. The BIVS project has expanded to some 30 grower participants, who meet monthly for breakfast and occasionally for field days. A BIVS coordinator was hired October 6, 1996. Miss Juliet J. Schwartz, holds a degree in agricultural business management from California State University, Fresno. She will be the liaison between the advisory team and the grower participants. She will also be responsible for the calling of the meetings, minutes of the meetings,data collection, and record keeping.

Objective 2 was the provision of a forum for discussion of issues pertaining to objective 1, exchanges of ideas, and support for incipient programs. Agenda items at breakfast meetings usually consist of a discussion on current vineyard management events such as cover crops, fertilization, and pest management. Upcoming field days or current research status, plus a presentation by an advisory team member or invited guest is also included at each monthly meeting. Summaries of our monthly breakfast meetings are as follows:

January-Dr. Mike McKenry was invited to speak about nematodes with growers. He presented information about different nematodes species and relative economic importance, nematodes migration habits and conditions which favor their population increase and damage to the vines.

March-A summary of the DPR IPM Innovators meeting held at the Kearney Ag Center in February was given for the benefit of those who could not attend. A report was given on the progress of Tim Prather's weed barrier project. Management practices were discussed for phomopsis and powdery mildew.

April- John Weddington from the Kings River Conservation District (KRCD) was the invited guest at this meeting. Mr. Weddington presented ideas and data on soil management for improving water infiltration. This area is a big concern for growers in the San Joaquin Valley because of the use of low salt canal water. He also described a KRCD project that looks at irrigation, energy, pest management, soil fertility, and wildlife while still maintaining optimum profit margins.

May-David Weinman of the California Table Grape Commission (CTGC) was invited to discuss the importance of interaction between the BIVS and the CTGC.

June-No meeting was held due to the field day scheduled in June.

July-Pest monitoring activities were discussed for each grower at the July meeting. Members who had monitored vineyards also received information on leafhopper, mite, and OLR counts.

August-Part of the meeting was spent discussing the progress on hiring of a BIVS coordinator. In addition, we discussed the status of a joint application with Sun Maid to the UC IPM Pest Cast program for weather monitoring equipment.

September-No meeting due to harvest.

October-The new BIVS coordinator, Juliet Schwartz, was introduced. The efficiency of fall nitrogen fertilization was discussed and compared to applications in mid-winter, bloom and fruit set. Results of the season's sampling of mites, leafhoppers, and OLR were distributed. Sanitation as an OLR management practice was discussed.

November-Handouts with growers' harvest data was distributed along with the BIVS weeds management practices, and the preliminary data on the weeds results. Dr. Tim Prather was present to discuss the weeds results and answer questions from growers.

December- Growers profiles were initiated this month; Al Smith was the first to present his perspective on the BIVS project, and the strategies he undertook in 1996. Dr.

Tim Prather discussed the data he had compiled on weeds continued from the November meeting.

Objective 3 was the set up of guidelines for each grower-participant to help meet the BIVS goals of minimizing the use of disruptive pesticides, minimizing off site pollution, optimizing inputs through more efficient applications, and the maintenance of yields, quality, and profitability. All grower-participants met with the advisory team to develop a set of biologically integrated management practices which will help them achieve the above stated goals. Growers designated a portion or all of their vineyards (from 5-40 acres) to be managed under the BIVS guidelines. At these meetings, three chemical input categories were targeted: weeds, insects/mites/nematodes, and pathogens. Some suggested practices within these categories to help meet BIVS objectives were:

Weeds- 1) Minimize the use of herbicides with potential for groundwater contamination (especially simizine) by using mechanical or contact herbicides as alternatives; 2) The BIVS management team discovered that there is some grower confusion about the necessary rate of simizine, which was leading to over-application in many cases. One strategy, therefore, was to reduced by 1/2 to 2/3 the amount of simizine applied.

Insects/Mites/Nematodes- 1) Intensive monitoring to establish treatment timing for spider mites, leafhoppers and omnivorous leafroller (OLR); 2) Contact or low mammalian toxicity materials such as horticultural oils or avermectin for spider mite control, and imidicloprid for leafhopper control; 3) Cahaba white vetch and compost to combat nematode infestations; 4) Soil and water management practices to improve plant tolerance to spider mite infestation.

Pathogens- 1) Substitute mineral fungicides (copper/sulfur) for synthetic (e.g., dithane) for phomopsis control; 2) Time powdery mildew treatments according to the UC model.

The set of practices each grower chose was a function of their needs, abilities and current practices. Intensive monitoring for pests was a part of all growers' programs. An outline of the practices BIVS growers undertook in 1996 is as follows:

Grower 1, (Sanger): Major problems: leafhoppers, weeds. BIVS practices: Use of imidicloprid for leafhoppers; use of naturally occurring parasites for mealybugs.

Grower 2, (Kerman): Major problems: weeds, leafhoppers, spider mites. BIVS practices: use a low rate of simazine (0.67 lb/applied ac) for weed control; cut nitrogen fertilization by 40%. Had a seven-year history of using cover crops for soil condition and pest management. Did not treat for leafhoppers, spider mites.

Grower 3 (Peach Ave., south Fresno) Major problems: nematodes, weeds. BIVS practices: use of compost and cahaba white vetch for nematode control. Used a lower rate of simazine (1 lb/applied ac). Did not treat for any pests in 1996.

Grower 4 (American Ave., south Fresno) Major problems: weeds. BIVS practices: used a lower rate of simazine (1 1/2 lb/applied ac). Did not treat for any pests in 1996.

Grower 5 (Belmont Ave., west Fresno) Major problems: weeds, spider mites. BIVs practices: no pre-emergent herbicides (glyphosate only) for weed control. Did not treat for leafhoppers, spider mites.

Grower 6 (Clovis Ave., southeast Fresno) Major problems: weeds, nematodes, spider mites. BIVS practices: use of compost for nematode control. Treated for spider mites with propargite, for leafhoppers with imidicloprid.

Grower 7 (Reedley) Major problems: weeds, leafhoppers, nematodes. BIVS practices: surflan rather than simizine for weed control; imidicloprid for leafhopper control; compost for nematodes.

Grower 8 (Madera) Major problems: omnivorous leafroller, leafhoppers. BIVS practices: cover cropping for soil improvement. Did not treat for OLR, spider mites, or leafhoppers.

Grower 9 (Selma) Major problems: leafhoppers. BIVS practices: cut nitrogen application to reduce leafhopper attraction; use imidicloprid.

Grower 10 (Raisin City) Major problems: mites, weeds. BIVS practices: use horticultural oil for spider mites; cut simizine rate (1 lb/applied ac)

Grower 11 (Kerman) New vineyard, no program yet.

Objective 4 was the monitoring of the BIVS allotted acreage as well as adjacent conventional plots (if present) for leafhoppers, OLR, and mites. All samples were taken from vines transected by randomly selected coordinates of the vineyard, taking samples weekly. Leafhoppers were counted on at least 30 leaves. The results were graphed for each grower and compiled in a table. Only three growers treated for leafhoppers in 1996 (Table 1), all with imidicloprid, which is used at very low rates (1/2-3/4 oz/ac) and is considered to have little impact on beneficials. OLR was monitored by examining 100 bunches per week. Two growers did not treat for OLR at all (Table 2), and three growers left a portion of their acerage untreated while they treated the remainder. Results showed little or no difference between the treated and untreated acreage (Table 2), indicating that timing or coverage of cryolite needs to be addressed. Spider mites were monitored on 30 leaves per site per week. Two growers treated for mites with propargite and one used horticultural oil (Table 3). At harvest, numbers of clusters per vine, grape berry weight, soluble solids, and yields were measured. Tray weights and yields were taken by counting and weighing 30 raisin trays or harvesting from 30 vines. Nutrient analyses were done on petioles sampled at bloomtime; nitrogen, potassium, phosphorus, zinc, and boron levels were measured.

Objective 5 was the demonstration of biologically integrated vineyard systems through field days. BIVS arranged three field days in 1996. The first was a cover crop demonstration day, attended by about 25 growers, and highlighted seven different cover crops or mixes which had been planted the previous fall. The second was a spider mite management field day, highlighting two experiments established at the vineyard of Jeff Jue, a BIVS member, and underwritten by the UC Davis PIAP program, the UC SAREP program, and industry groups. The experiments were designed to test the impact of alternatives to propargite for mite control, including horticultural oil and avermectin. About 80 growers attended. The third field day was exclusively for BIVS members, and highlighted the weed control studies being conducted by Dr. Tim Prather, a technical advisor to the BIVS project. Six growers participated along with the management and technical advisory team.

The major successes for the BIVS program were the field days, all of which received some television/radio coverage and were partly or fully sponsored by BIVS. The cover crop field day, held in April of 1996, was covered in Grape Grower Magazine, Ag Alert (California Farm Bureau), and local TV/radio (KMPH). The weeds and mite field days, held in May and June, also received TV and radio coverage. Articles about the BIVS group for various trade publications is in the works.

Community outreach: BIVS growers have participated in semi-formal meetings to discuss the objectives of the group. In February 1996 Larry Meisner, John Tufenkjian and Jeff Jue participated in the DPR IPM Innovators meeting at the Kearney Agricultural Center in Parlier.

Leafhopper Nymphal Counts 1996

Average nymphs per leaf

Table 1

Sampling Week

Grower number/Location	May 20	May 27	June 3	June 10	June 17	June 24	July 1	July 8	July 15	July 22	July 29	Aug. 5	Aug. 12	Aug. 19	Aug. 26	Materials Used
1-Sanger	19.5	0	0	0	0	0	0	0	0.03	0.2	0.1	-	0	0.03	0.1	Provado May
2-Fresno	3.05	-	1.9	-	0.4	0.36	0.03	1.4	0.43	1.16	0.16	0.03	0.23	0.26	1.10	None
3-Fresno	5.8	-	-	-	0.13	0.2	0.96	3.56	2.1	8.3	2.13	0.16	0.16	1.03	1.9	None
4-Fresno	4.96	-	-	-	-	0.1	.56	2.6	-	7.23	5.8	0.23	0.33	0.83	1.16	None
5-Fresno	1.68	-	-	-	-	0.2	0.1	0.33	0.53	0.26	0.33	0.26	0.03	0.36	0.86	None
6-Fresno	3.0	-	-	-	.2	0.06	0.1	0.43	0.2	-	-	-	-	-	0.16	Provado May
7-Fresno	-	7.75	-	-	0.26	1.06	0.46	5.33	5.5	8.6	0.1	0	0.23	0.2	0.43	Provado July
8-Fresno	3.46	-	-	-	0.36	0.3	0	2.5	1.6	1.2	1.03	1.33	-	0.73	2.0	None
9-Fresno	-	3.73	-	-	.06	.06	.88	-	-	-	-	-	-	-	0.33	None
10-Fresno	-	-	-	-	0	0.06	0.33	0.46	.0.43	0.16	0.06	0.03	0.03	0.46	0.73	None

OLR Counts 1996

Average Percent of Clusters with OLR Damage per Generation

Table 2

Grower number/Location	1st Brood	2nd Brood	3rd Brood	Materials Used
1-Sanger (Treated)	0	0.8	1.4	Cryolite May
1-Sanger (Untreated)	0	0.8	0.5	None
2-Fresno	4.0	4.3	3.0	Cryolite May and July
3-Fresno	3.0	3.5	3.2	None
4-Fresno	0	1.8	2.0	None
5-Fresno	2.0	9.3	5.8	Cryolite July
6-Fresno	3.0	0.2	0	Cryolite May and June
7-Fresno	11	3.75	2.25	Cryolite May
8-Fresno (Treated)	2.0	1.4	4.0	Cryolite May
8-Fresno (Untreated)	1.5	1.25	4.5	None
9-Fresno	0.5	1.0	2.0	Cryolite May
10-Fresno (Treated)	0.5	0.16	2.4	Cryolite May
10-Fresno (Untreated)	0	0	-	None

BIVS Program, Central San Joaquin Valley

Mite Infestation 1996

Average Percent of Leaves with Mites

Table 3

Sampling Week

Grower/Location	June 10	June 17	June 24	July 1	July 8	July 15	July 22	July 29	Aug. 5	Aug. 12	Aug. 19	Aug. 26	Materials Used
1-Sanger	-	-	-	0.3	15.0	17.0	26.0	50.0	-	0	0.6	23.0	None
2-Fresno	0.6	0.3	-	20.0	0.3	13.0	0.6	0	0	0	0	13.0	None
3-Fresno	-	0	-	16.0	16.0	56.0	80.0	63.0	43.0	50.0	0	50.0	None
4-Fresno	-	-	-	0	10.0	46.0	46.0	50.0	6.0	33.0	0	30.0	None
5-Fresno	-	-	-	0.3	0.3	16.0	0	0	16.0	0.6	0	10.0	None
6-Fresno	-	0.3	-	0.3	40.0	10.0	-	-	-	-	-	13.0	Omite July 18
7-Fresno	-	10.0	-	0.6	0.3	20.0	33.0	0	0.3	0.6	0.3	10.0	None
8-Fresno	-	-	-	43.0	16.0	10.0	26.0	10.0	23.0	-	0.13	36.0	None
9-Fresno	-	-	-	13.0	-	-	-	-	-	-	-	10.0	Omite July ?

Mite Infestation 1996

Average Number of Mites per Leaf

10-Fresno	1.8	2.7	2.0	5.6	13.3	21.1	30.3	4.5	9.8				Oil June 25 and July 24